Case Report

Biliary stenting for intrahepatic duct injury in an adult with blunt abdominal trauma

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Abstract

Major bile duct injury accompanying bile peritonitis after blunt abdominal trauma is extremely rare in adults. Here, we describe the case of an adult patient with intrahepatic duct lesion that was managed by T-tube stenting.

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1. Introduction

Major bile duct injury in patients with abdominal trauma could be fatal if diagnosis is delayed. Confined biloma is the most common complication in these patients, while bile peritonitis from major bile duct lesion in blunt abdominal trauma is extremely rare. Here, we describe a rare case of a patient with traumatic bile peritonitis caused by an isolated intrahepatic duct injury; the condition of this patient was managed by T-tube stenting. We also review and discuss the modalities used for the diagnosis and treatment for major bile duct injury that follows trauma.

2. Case report

A 27-year-old male riding a motorcycle was hit by a car. In the accident, his abdomen was bluntly impacted by motorcycle’s handle bar. On presentation, the patient had mild upper abdominal pain, nausea, and vomiting. Computed tomography (CT) of the abdomen disclosed a grade 4 liver laceration (Fig. 1) originating at the hepatic hilum and extending posteriorly to segment 4 and parts of segment 5, 7 and 8. Considering the stable hemodynamic status, nonsurgical management was elected.

Over the next 3 days, progressive abdominal pain with diffuse distension, tenderness, and jaundice developed and an elevated serum bilirubin of 7.7 mg/dL occurred with no change in hemoglobin. Repeated CT revealed massive peritoneal fluid accumulation (Fig. 2). Diagnostic peritoneal lavage (DPL) was performed, and a large amount of bile-stained turbid fluid was obtained, with a total bilirubin level of 83.5 mg/dL. An emergent exploratory laparotomy was performed.

Two liters of bile-stained fluid was removed from the peritoneal cavity. A laceration of the hepatoduodenal ligament was identified, extending upward to involve Glisson’s capsule on the posterior surface of segment 4. Active bile leakage was identified from the disrupted intrahepatic duct of the lacerated lateral segmental liver closed to the falciform ligament (Fig. 3). A Silicon 10 French T-tube was placed in the disrupted intrahepatic duct and the ruptured Glisson’s capsule was sutured.

The patient’s postoperative course was uneventful. Approximately 2 months postoperatively, a T-tube cholangiogram demonstrated a normal biliary tract system, and the T-tube was removed. The patient was doing well 6 months after removal of the T-tube.

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3. Discussion

Bile peritonitis in patients with blunt abdominal trauma is extremely rare. In most cases, bile peritonitis is caused by gall bladder injury, although in some reported cases, the disorder is reported to be caused by extrahepatic duct lesions.1,2 In the literature, there are few reports of bile peritonitis of a bile duct lesion following blunt abdominal trauma. According to Yoshihiro’s review,3 only 30 cases of the right or left hepatic duct lesions, either independently or at the bifurcations, have been reported in the English-language literature between 1929 and 1995. No published reports on open surgery for intrahepatic duct injury following blunt abdominal trauma are available.

Lesions of the main bile duct after blunt abdominal trauma are most commonly observed in patients with severe and multiple organ damage and the hepatoduodenal region is the most common location of bile duct injury.4–6 Several mechanisms of injury were proposed but were largely speculative; however, there are two main proposed mechanisms to be considered.7–9 First, the proximal hepatic duct parts, the left and right hepatic ducts and the ductal bifurcations, are relatively fixed to the liver and can potentially “cushion” the transmitted energy. Shearing forces lead to an acute increase in the intraductal pressure and subsequent tearing. The second theory of ductal injury involves compression of the ductal system against the vertebral column. In the patient described here, it is possible that the blunt traumatic energy transmitted through the hepatoduodenal ligament and then terminated within the upper edge of the hepatoduodenal ligament and the hepatic segmental duct. The stretching or crushing force was loaded on the “rigid” part between the left side ductal confluence and the insertion of the umbilical ligament, and disrupted the proximal left lateral segmental duct. The associated lacerated Glisson’s capsule provided a route for the unhindered bile flow from the lacerated duct to the peritoneum. With an output exceeding the rate of peritoneal absorption or wall-off, the leaked bile spread and filled the whole peritoneal cavity.

Preoperative diagnosis is challenging, because initial physical examinations, as in this case, are frequently non-conclusive.3 The peritoneal bile gives minimal irritation, which is easily missed and misdiagnosed in the early phase, and will not become physically overt except if enough volume or infective contents develop. Except for cases in which immediate laparotomy is taken, most diagnoses are delayed. DPL, CT and ultrasonography, the most common applied tools in abdominal trauma, cannot provide reliable information regarding bile duct injuries. DPL is traditionally a rapid and sensitive investigation for intraperitoneal bleeding and hollow organ perforation in abdominal trauma. Some authors reported the criteria of either gross bile aspirate, or lavage fluid with an elevated amylase/bilirubin level for diagnosing bile tract lesion.1,4 However, the result cannot reflect the nature of bile...
duct lesion, nor can it provide guides to the treatment. Additionally, the DPL diagnosis in bile duct lesion demands a closed follow-up if the initial treatment is nonoperative. CT scans and abdominal sonography, in the presence of local or excessive peritoneal fluid accumulation or biliary dilatation, can provide rapid assessment for the bile duct complication, however these findings are suggestive only and are not diagnostic. Endoscopic cholangiography clearly demonstrates the extravasation of injected contrast material from the injured bile ducts, but the unstable status of the patient prohibits its application in acute phase of trauma. Hepatobiliary scintigraphy and Magnetic Resonance Cholangiopancreatography (MRCP) have particular sensitivity for active bile leakage and bile duct lesions, but the availability and time consumption of the investigations restrict the application in trauma. Nonetheless, a high index of clinical suspicion and a close follow-up (in nonoperative treatment) is important. The DPL and CT scans in this case provided implicative information, while the porta hepatitis involvement on the CT scans highly suggested a major hepatic duct lesion.

The goal of treatment for biliary tree injuries is to establish the continuity of the bile flow into the proximal gastrointestinal tract as well as to avoid biliary stricture formation and cholangitis. Alternatives of open surgery for major bile duct injuries in abdominal blunt trauma include simple drainage, ligation, stenting, T-tube placement, primary repair and hepaticoenteral anastomosis with or without stents. The location, degree of injury and surgeon’s experience dictate the choice of repair. Notably, an open exploration cannot detect all the bile duct lesions, because 20% missed diagnosis rate has been reported in cases accepting open exploration without the use of intraoperative cholangiography or endoscopic retrograde cholangiopancreatography (ERCP). Biliojejunostomy or bilioduodenal anastomosis is the treatment of choice for high-degree injuries of the extrahepatic bile duct because simple closure and primary end-to-end anastomosis is accompanied by a risk of subsequent stricture if the tear is greater than half the circumference of the duct. Currently, minimally-invasive treatments, such as endobiliary stenting in combination with percutaneous drainage or laparoscopic lavage, are effective in selected circumstances. In this case, primary closure of the disrupted Glisson’s capsule with temporary T-tube stenting was a simple, safe and effective alternative treatment to either bilioenteric anastomosis or primary repair considering that the lesion was deep within the hepatic parenchyma. Lateral segmental resection of the left hepatic lobe was another option, but seemed unnecessary considering the invasiveness.

Herein, we report a rare case of a patient with major bile duct lesion that developed after blunt abdominal trauma. A high index of suspicion and close follow-up are the keys to early detection, because the initial diagnostic work-ups in the case of such lesions can be subtle. Liver lacerations involving porta hepatitis, the upper end of the hepatoduodenal ligament, should hint at the major extra- or intrahepatic duct lesions. DPL, apart from assisting in the diagnosis of active bleeding or hollow organ perforation, provides clues for bile duct injury. Early diagnosis and intervention are the keys to a successful outcome. In the case of patients who present with bile duct lesions located inside the hepatic parenchyma, a primary approximation of the external capsule in addition to T-tube stenting provides a simple, safe and effective treatment.

**Conflict of interest**

All authors have no financial and personal relationships with other people or organizations that could inappropriately influence (bias) their work.

**References**